## VIII.—*Remarks on the Fifth Cubital Remex of the Wing in the* Carinatæ. By P. L. Sclater, Ph.D., F.R.S., &c.

One of the most remarkable discoveries in the ptilosis of birds that has been made of late years is that the fifth cubital remex (or fifth secondary) is entirely absent in many groups. This curious fact appears to have been first pointed out by M. Z. Gerbe in 1877, in a communication made to the Zoological Society of France*.

M. Gerbe writes as follows:—

"Chez les Rapaces, les Pigeons, les Echassiers et les Palmipèdes, il y a atrophie complète de l'une des rémiges secondaires, et cette atrophie, qui paraît être originelle, porte invariablement sur la cinquième. Ses satellites, c'est-à-dire sa couverture supérieure et sa couverture inférieure, prennent un développement normal, et occupent leur place, respective, comme si elles accompagnaient la penne qui fait défaut.

"Ni les vrais Passereaux, ni les Zygodactyles (les Perroquets exceptés) ne présentent cette singulière anomalie."

After a lapse of ten years, during which period no one seems to have alluded to the subject, Wray, in the course of his studies of the bird's wing, undertaken during the preparation of specimens for the Index-series in the British Museum of Natural History, rediscovered this phenomenon, and described it, in his valuable paper on the Morphology of the Wings of Birds, as follows†:—

"The chief, most interesting, and most puzzling modification of the cubital feathers is that in a great many birds the fifth remex is always undeveloped, its coverts being normally developed and present. This occurs probably in all birds except *Phœnicopterus*‡, Gallinæ, Passeres, and a few Picariæ. Up to the present I have never met with a trace of this feather in a vestigial condition. If the figures of the preparation of the distal part of the cubitus of the Golden Eagle (see figs. *b, b′*) be compared with those of the Pheasant (see figs. *a, a′*), the exact nature of this modification is at once apparent. In the Pheasant (*a, a′*) the fifth remex is present

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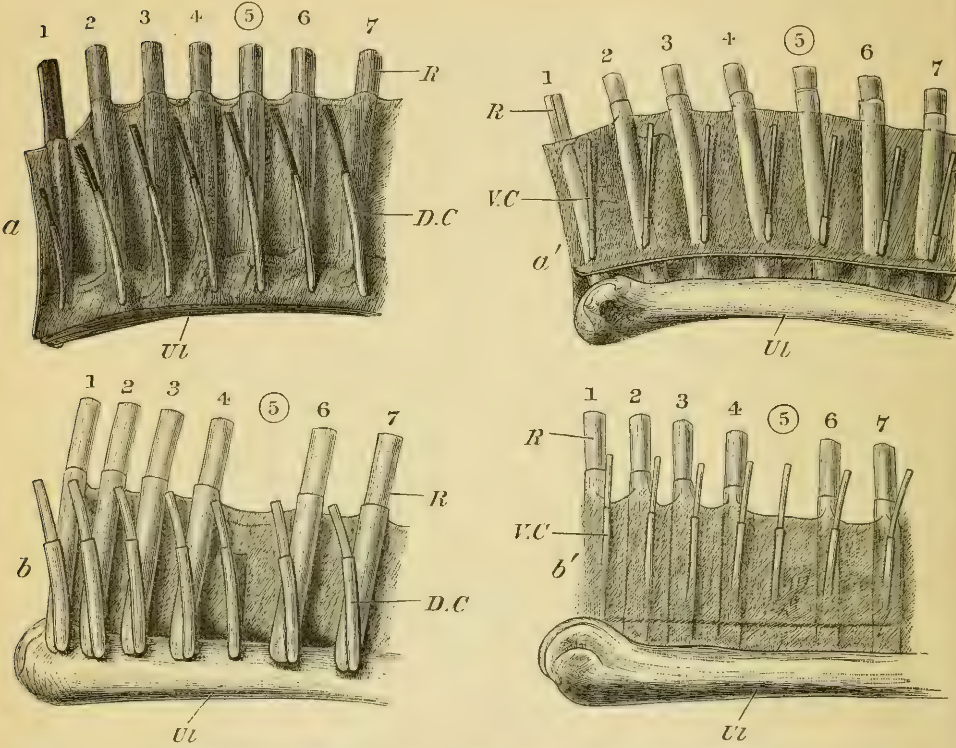
* Bull. Soc. Zool. de France, ii. p. 289 (1877).

† "On some Points in the Morphology of the Wings of Birds," by Richard S. Wray, Proc. Zool. Soc. 1887, p. 343. I am much indebted to the Publication Committee of the Zoological Society of London for their permission to reproduce Wray's excellent illustrations of this subject.

‡ [This inclusion of *Phœnicopterus* among the quincubital birds is an error. As will be shown below, *Phœnicopterus* is aquincubital.—P. L. S.]



*a, a′*. Drawings of preparations of the distal cubital remiges, with their attached tectrices majores, of the Pheasant (*Phasianus colchicus*). *a*, Dorsal view; *a′*, ventral view. (This shows the "quincubital" condition.)

*b, b′*. Drawings of preparations of the distal cubital remiges, with their attached tectrices majores, of the Golden Eagle (*Aquila chrysaetos*). *b*, Dorsal view; *b′*, ventral view. (This shows the "aquincubital condition.")

1, 2, 3, &c. the remiges (*R*), numbered from the wrist-joint; *D.C*, dorsal tectrix major; *V.C*, ventral tectrix major; *Ul*, ulna.

(From P. Z. S. 1887, p. 346.)

with its coverts, showing all normal relations; in the Golden Eagle (*b, b'*) the coverts are present but no remex. The former condition may be termed *quincubital*, the latter *aquincubital*. Such is the constancy of one or the other condition in each natural group, that I have as yet met with no exceptions anywhere, except among the so-called Picariæ, many of which are, and most of which probably will turn out to be, *quincubital*. The Goatsuckers are *aquincubital*, while the Swifts are *quincubital**. *Pterocles* is *aquincubital*; *Goura* is *aquincubital*. Of course exceptions may turn up, seeing that of the whole number of birds but a comparatively few have as yet been tested for this point."

Besides M. Gerbe and Wray, the only author who has as yet touched upon this subject is Dr. Gadow, who, in his recent paper "On the Numbers and on the Phylogenetic Development of the Remiges of Birds," read before the Zoological Society in December 1888 (see P. Z. S. 1888, p. 655), after alluding to the discovery of this phenomenon by the authors above mentioned, adds to his tables of the numbers of remiges in the bird's wing the condition of the fifth cubital remex (whether present or absent) in the different groups, so far as it was known to him. Simultaneously with Dr. Gadow I had been making some researches on the same subject, which were materially assisted by the preparation in the laboratory of the Prosector in the Zoological Society's Gardens of a certain number of birds' wings, arranged so as to show the state of the fifth cubital remex very readily. It is a pity, I think, that any knowledge on this curious point once acquired should be lost, so that, although I cannot add much to the subject, I propose to run through the various orders of Carinate birds†, and to show in what cases yet known to us the fifth cubital remex is present or absent, or sometimes present and sometimes absent, and, in the case of variable groups where it is desirable to be quite positive, on what exact species the observations have been made.

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* [Some Swifts seem to be aquincubital. See below.—P. L. S.]

† As adopted in the arrangement given in my paper "On the present State of the 'Systema Avium'," Ibis, 1880, p. 410.

I. PASSERES. In all the true Passerine birds yet examined the fifth cubital remex is present. Gerbe, Wray, and Gadow alike agree to this. It is nevertheless very desirable that all the abnormal forms of Passeres should be examined with reference to this point.

II. PICARIÆ. The Picarian birds have not the same homogeneous structure as regards their cubital remiges as the Passeres. We will therefore consider their six divisions or suborders *seriatim.*

a. *Pici.* In all the Woodpeckers yet examined the fifth *c. r.* has been found present. I have before me prepared specimens of *Colaptes auratus, Picus major, Tiga shorei, Centurus striatus,* and *Iynx torquilla.*

b. *Cypseli.* In the Trochilidæ the fifth *c. r.* is apparently present, in the Caprimulgidæ it is absent, in the Cypselidæ it is sometimes present and sometimes absent.

In true *Cypselus,* as stated by Wray, the fifth *c. r.* is present, as it is also in the Tree Swift (*Dendrochelidon*). But I find it absent in a specimen of a species of *Collocalia,* which is certainly a member of this family.

c. *Anisodactylæ.* In the Anisodactylous Picarians, as a rule, the fifth *c. r.* is present. Out of the twelve families enumerated in my above-mentioned paper (see Ibis, 1880, p. 401), I have found the following genera, so far as they have been examined, to be quincubital:—*Colius, Buceros, Upupa, Merops, Todus, Podargus,* and *Steatornis.*

Dr. Gadow adds *Coracias* to the list. He also gives the fifth *c. r.* as present in *Alcedo* and *Halcyon.*

But my observations induce me to believe that there is a singular anomaly in this respect in the Alcedinidæ. I find the fifth *c. r. present* in *Alcedo ispida, Cittura sanguirensis,* and *Ceryle americana,* but *absent* in *Halcyon vagans* and *H. chloris.* What is still more remarkable, it seems to be absent in *Ceryle alcyon,* though it is certainly present in a specimen of *C. americana* now before me.

d. *Heterodactylæ,* e. *Zygodactylæ,* and f. *Coccyges.* In these three remaining suborders of the Picarians the fifth *c. r.* appears to be always present. I have examined *Rhamphastos, Selenidera, Aulacorhamphus, Indicator, Megalæma,* and *Xantholæma,* and many genera of Cuculidæ*, as also *Corythaix* and *Schizorhis.* Dr. Gadow's researches, so far as they go, show the same result, and he also gives it as present in *Trogon.*

Therefore, as a rule, we may say that the Picarians are quincubital, except the families Cypselidæ and Alcedinidæ, in which some forms are aquincubital.

III.–X. PSITTACI, STRIGES, ACCIPITRES, STEGANOPODES, HERODIONES, ODONTOGLOSSÆ, PALAMEDEÆ, and ANSERES. In all members of these eight classes yet examined the fifth *c. r.* is wanting. Dr. Gadow's tables agree with my observations on this subject. Wray (see above, p. 77) has stated that the fifth *c. r.* is present in *Phœnicopterus.* But this is certainly not the case in examples of two species of this genus which I have examined (*P. antiquorum* and *P. ignipalliatus*), and I believe that Wray was in error on this point. Dr. Gadow agrees with me in registering *Phœnicopterus* as having no fifth *c. r.*

XI. COLUMBÆ and XII. PTEROCLETES. In the Columbæ, as also in *Pterocles,* I believe the fifth *c. r.* to be absent. This is also stated by Dr. Gadow, but more observations are required upon these birds.

XIII. GALLINÆ. In the typical Gallinæ generally the fifth *c. r.* is fully developed (see illustrations of *Phasianus,* above, p. 78). But this is not, perhaps, the case in *Megapodius,* where Mr. Beddard found it *absent* in a specimen of *Megapodius rubrifrons.* The Cracidæ likewise require further examination, but I find a fifth *c. r.* present in species of *Crax, Penelope, Pipile,* and *Ortalis.*

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* The species of Cuculidæ examined were :—

Rhinococcyx curvirostris.
Pyrrhocentor celebensis.
Centropus, sp. inc.
Eudynamis orientalis.
—— taitensis.
Cacomantis sepulchralis.
—— lanceolatus.
Cuculus canorus.
Piaya cayana.
Coccyzus americanus.
Diplopterus nævius.
Saurothera dominicana.
Geococcyx affinis.
Guira piririgua.
Crotophaga ani.
—— sulcirostris.

XIV. OPISTHOCOMI and XV. HEMIPODII. In *Opisthocomus,* which I have carefully examined, the fifth *c. r.* is present, as in the Gallinæ. It is likewise present in *Turnix.* I have examined *Turnix sykesi.*

XVI. FULICARIÆ. In the Rails, so far as they have yet been examined, the fifth *c. r.* is absent.

XVII. ALECTORIDES. The Cranes and their allies are not in unison as regards the fifth *c. r.* In *Grus, Aramus,* and *Eurypyga,* according to Dr. Gadow, this remex is absent, but present, according to the same authority, in *Psophia, Cariama,* and *Rhinochetus.* I can confirm this as regards *Psophia crepitans.*

XVIII. LIMICOLÆ. No true Limicolæ have the fifth cubital remex developed, so far as they have yet been examined. In *Parra* it is also absent.

XIX. GAVIÆ. As might have been expected, the Gaviæ imitate their close allies the Limicolæ in having no fifth *c. r.*

XX. TUBINARES and XXI. PYGOPODES. The same is, I believe, the case in the Tubinares and Pygopodes. The fifth *c. r.* is absent.

XXII. IMPENNES. In the Penguins the remiges are not sufficiently differentiated to enable us to come to any conclusion as to the fifth *c. r.*

XXIII. CRYPTURI. In the Tinamous, as in the Gallinæ, the fifth *c. r.* seems to be always present. Mr. Beddard has kindly ascertained for me that this is undoubtedly the case in the following species of this group:—*Nothoprocta perdicaria, Tinamus solitarius, Crypturus noctivagus,* and *Calodromas elegans.* Prepared wings of *Nothura maculosa* and *Rhynchotus rufescens* now before me show the fifth *c. r.* well developed.

Thus the Carinate birds may be divided into three categories as regards the presence or absence of the fifth cubital remex:—

| I. Fifth cubital remex present. | II. Fifth cubital remex sometimes present, sometimes absent. | III. Fifth cubital remex absent. |
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| I. Passeres. | | |
| | II. Picariæ. | |
| | | III. Psittaci. |
| | | IV. Striges. |
| | | V. Accipitres. |
| | | VI. Steganopodes. |
| | | VII. Herodiones. |
| | | VIII. Odontoglossæ. |
| | | IX. Palamedeæ. |
| | | X. Anseres. |
| | | XI. Columbæ. |
| | | XII. Pterocletes. |
| | XIII. Gallinæ. | |
| XIV. Opisthocomi. | | |
| XV. Hemipodii. | | |
| | | XVI. Fulicariæ. |
| | XVII. Alectorides. | |
| | | XVIII. Limicolæ. |
| | | XIX. Gaviæ. |
| | | XX. Tubinares. |
| | | XXI. Pygopodes. |
| XXIII. Crypturi. | | |

### *Summary.*

1. The fifth cubital remex of Carinate birds is abnormally absent, except in the Passeres, Opisthocomi, Hemipodii, and Crypturi, and in some Picariæ, Gallinæ, and Alectorides.

2. In the Picariæ it is generally present, except in some Cypselidæ and Alcedinidæ.

3. In all the Gallinæ it is present except in the Megapodes.

4. In the Alectorides it is generally absent, except in *Psophia, Cariama,* and *Rhinochetus.*

5. Both the dorsal and the ventral *tectrix major* of the fifth cubital remex, when it is absent, are fully developed.

6. We know of no intermediate stage between the full development of the fifth cubital remex and its entire absence.